BS 4142:2014 CONTEXT AND CASE STUDIES

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1 CONTEXT IN BS 4142

BS 4142:2014 [1] 'Method for rating and assessing industrial and commercial sound' is a commonly used method for undertaking noise impact assessments for industrial sources affecting residential receptors. This method requires consideration of the context of the industrial sound in interpreting the significance of the impact.

BS 4142:2014 and its predecessors have often given mention, or consideration, of the issue of context, although they have not always used that particular term. For example, the 'Wilson Report' (1963) [2] that initiated the development of BS 4142:1967, stated:

> *"A noise problem must involve people and their feelings, and its assessment is a matter rather of human values and environments than of precise physical measurement".*

And

> *"It is well known that the actual loudness of a noise is not, by itself, a measure of whether it will give rise to annoyance or complaint. The reaction of the hearer is affected, for example, by the kind of noise, by whether it occurs during the daytime or at night, by the general level of noise already existing, by whether the hearer has become accustomed to it, and so on."*

Likewise, BS 4142:1990 [3] mentioned how local attitudes could affect the likelihood of complaints (but did not expand on the issue):

> *"For the assessment procedure, the likelihood of a noise provoking complaints depends on its level relative to the background noise level, and whether or not it has certain audible characteristics. Other factors, such as local attitudes to the premises in question may also have an effect but these cannot be included in this assessment procedure"*

Following the same principles, BS 4142:1997 [4] stated:

> *"Response to noise is subjective and affected by many factors (acoustic and non-acoustic). In general, the likelihood of complaint in response to a noise depends on factors including the margin by which it exceeds the background noise level, its absolute level, time of day, change in the noise environment etc., as well as local attitudes to the premises and the nature of the neighborhood. "*

And

> *"The standard is necessarily general in character and may not cover all situations. The likelihood that an individual will complain depends on individual attitudes and perceptions in addition to the noise levels and acoustic features present. This standard makes no recommendations in respect of the extent to which individual attitudes and perceptions should be taken into account in any particular case*

Supporting policies also consider the issue of context (such as the Noise Policy Statement for England [5]), however, this term is generally linked to 'the context of sustainable development' rather than the wider remit of context presented in BS 4142:2014.

2 BS 4142:2014

BS4142:2014 significantly expands on the issue of context, including:

> *"Response to sound can be subjective and is affected by many factors, both acoustic and non-acoustic. The significance of its impact, for example, can depend on such factors as the margin by which a sound exceeds the background sound level, its absolute level, time of day and change in the acoustic environment, as well as local attitudes to the source of the sound and the character of the neighbourhood. This edition of the standard recognizes the importance of the context in which a sound occurs. Great care has, therefore, been taken in the use of the words "sound" and "noise". Sound can be measured by a sound level meter or other measuring system. Noise is related to a human response and is routinely described as unwanted sound, or sound that is considered undesirable or disruptive."*

This issue of context continues throughout the standard, most notably in Section 11 which presents a method for the assessment of the magnitude of the impact (comparing the Specific sound level from the site under investigation to the Background L_{90} sound level):

> *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
>
> *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context*

BS 4142:2014 links the terms 'around' and 'context' together, and this implies that the assessment thresholds of +10dB or +5dB have an element of flexibility to them that allows the assessor to interpret the significance of the impact.

2.1 The elements of context

The elements of context to be considered in a BS 4142:2014 assessment could include:

- Weekdays and weekends
- The time of day
- The absolute sound levels
- Where the sound occurs
- New industry or new residences
- The scale of the industrial or residential areas
- Intrinsic links between the source and receptor
- Local attitudes
- The residual acoustic environment
- What the sound 'means' (conveying an unpleasant meaning beyond its acoustic content)
- The land use at the receptor (e.g. gardens vs yards)

Plus whatever else might be particular to an individual situation

Consideration of the sum of these elements could influence the context towards either being more or less sensitive to pollution. For example, if the residual acoustic environment is comprised of

natural sound sources, then that element of the context may make the receptor more sensitive, but if the same scenario also has pollution that only occurs during normal weekday working hours and at a relatively low level, then that element of the context may make the receptor less sensitive. These elements, when considered together, may pull equally in either direction, resulting in no need to adjust the overall sensitivity of the context. It is the sum of these contextual elements that needs to be considered, not just one particular element that would then bias the assessment.

An assessment of the context requires the assessor to subjectively experience the noise as well as to objectively measure the sound, and to then use their professional judgment to find a well-informed balance between the two.

2.2 The limitations and justification of context

BS 4142:2014 does not present a limitation on how great 'around' would stretch with regard to the assessment thresholds of 'around +5dB' and 'around +10dB', however, common sense should prevail. Wherever the assessment thresholds of +5dB or +10dB have been modified due to the context of the pollution, then that modification should be justified, and the greater the modification to these thresholds then the greater the justification should be.

It is worth noting that the overarching principles of the Noise Policy Statement for England should also be taken into account. For example, Section 2.18 states:

> *There is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focussing solely on the noise impact without taking into account other related factors.*

Therefore, the continued operation of a problematic, but strategically important industry could potentially be justified under the Noise Policy Statement for England, rather than by modifying the assessment result of the BS 4142 investigation from what would otherwise be a significant adverse impact.

3 EXAMPLES

3.1 Fabrics factory

This case presented a receptor that was elevated over the source, and was complaining about the site noise at a 4th floor attic window. The source was a fabrics factory below which had a thin roof. The source was operating continuously other than for occasional shut-downs. Measurements were taken at the 4th floor window façade, but as there was typically less than 3dB between the Ambient and Residual sound levels, these measurements could not be used (as per BS 4142:2014 section 7.3.3).

It was not possible to measure closer to the source due to an intervening river, and measurements at the source were also impossible due to the dangers of accessing the factory roof, and so a quieter period of Residual sound was targeted (as per BS 4142:2014 section 7.3.4), which included a temporary shut-down during a national holiday.

During this quieter period, the results showed the site to generating +8dB over Background, however, the context of the scenario was of an inaccessible and unused 4th floor attic window, and only measureable on the quietest (and unrepresentative) night of the year. The site was generally bland in character, and typically inaudible at typical background levels.

I considered that the site was not causing an adverse impact, and as a regulator, I recommended 'no further action' due to the context and the unrepresentative background and residual measurements.

3.2 Dockland loading

This situation presented an isolated and dense area of heavy industry at a docklands with some adjacent new housing. The area had a significant volume of traffic, and the site was occasionally audible between the vehicle passes.

The acoustic content of the site and the traffic was identical, making the isolation and identification of the site noise very difficult. To be able to get a measurable difference between the Ambient and Residual sound levels, many hundreds of vehicle passes were paused out of the measurements.

Once the site noise had been isolated in this way, it presented a level of +18dB over Background. However, this assessment had fundamentally misrepresented the context by removing all the vehicles, and was arguably also an unrepresentative measurement of the Residual sound level. The operator was using all appropriate measures to prevent or minimize the site noise, and further consideration was given to the strategic significance of the site under the Noise Policy Statement for England. With these elements in mind, I recommended 'no further action' to be taken.

3.3 Waste transfer station

This waste transfer station was started by a landowner who started this business in a small disused quarry behind his house. He later sold the WTS, but remained in his house and started to complain about the noise from the site he had started next-door. The site shared a common boundary, and the main sources in the site were within 75m of the dwelling with additional sound reflecting off the quarry wall behind the WTS and towards the dwelling. A BS 4142:2014 assessment found typical levels of +6dB to +9dB over Background.

Due to the intrinsic link between the source and the receptor, together with the WTS operator using appropriate measures to prevent or minimize the noise, I recommended 'no further action' to be taken.

3.4 Wood chipper

This waste industry used a very large chipper to fragment waste wood, and occasionally waste Perspex sheets outdoors. They also had a clean (non-waste) wood stream that was housed within a large building. The receptor was in a small rural village, 600m away across open fields.

To minimize uncertainty, a longer period of monitoring was used, and out of 7 days of monitoring, the site was only active for 4 days, and only clearly measureable at the receptor for 2 of those days. When the site was active and measureable the site noise was very distinct, particularly when chipping Perspex sheets, and was in the range of +10dB to +13dB over Background.

With regard to the context, there were elements that made the receptor more sensitive to pollution. The receptor was very rural, it was a new noise source, and the sound of chipping was particularly intrusive and incongruous to the residual acoustic environment. However, there were also elements that reduced the sensitivity of the context. The site was only audible and measureable on 2 days out of 7, other industries were occasionally audible, and the receptor was close to the flight path of a small, local airport. When considering all these elements together, it was decided not to modify the assessment thresholds based on context as the contextual elements were balanced equally.

As the operator was not using appropriate measures to prevent or minimize the noise (by chipping outdoors instead of in their available building) enforcement action was taken, and the operator was successfully prosecuted.

4 REFERENCES

[1] BS 4142:2014 'Methods for rating and assessing industrial and commercial sound'. British Standards Institute. 2014

[2] Committee on the Problem of Noise (Wilson Committee): Records. 1963

[3] BS 4142:1990 'Method for rating industrial noise affecting mixed residential and industrial areas'. British Standards Institute. 1990

[4] BS 4142:1997 'Method for rating industrial noise affecting mixed residential and industrial areas'. British Standards Institute. 1997

[5] Noise Policy Statement for England. DEFRA 2010